KPDES FORM HQAA

Kentucky Pollutant Discharge Elimination System (KPDES)

High Quality Water Alternative Analysis

The Antidegradation Implementation Procedures outlined in 401 KAR 5:030, Section 1(3)(b)5 allows an applicant who does not accept the effluent limitations required by subparagraphs 2 and 3 of 5:030, Section 1(2)(b) to demonstrate to the satisfaction of the Environmental and Public Protection Cabinet that no technologically or economically feasible alternatives exist and that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the water is located. The approval of a POTW's regional facility plan pursuant to 401 KAR 5:006 shall demonstrate compliance with the alternatives analysis and socioeconomic demonstration for a regional facility. This demonstration shall also include this completed form and copies of any engineering reports, economic feasibility studies, or other supporting documentation

I. Permit Information

Facility Name:	Nally & Hamilton Enterprises, Inc.	**KPDES NO.:**	/ 861-0487
Address:	P.O. Box 157	**County:**	Knox
City, State, Zip Code:	Bardstown, KY 40004	**Receiving Water Name:**	Buckeye Fork, Unnamed Tributary to Acorn Fork, & Acorn Fork

II. Alternatives Analysis - For each alternative below, discuss what options were considered and state why these options were not considered feasible.

1. **Discharge to other treatment facilities.** Indicate which treatment works have been considered and provide the reasons why discharge to these works is not feasible.

The closest water treatment facility to Stinking Creek, in Knox County (Lat: 36° 57' 14.9" / Lon: 83° 38' 12.2") is the Barbourville wastewater treatment facility in Knox County (Lat: 36° 51' 56" / Long: 83° 53' 16"). Thus, the wastewater treatment facility is approximately 15.18 miles from the job site.[1] To effectively transport the discharge to this facility it would require multiple lift and pump stations, (which are approximately $200,000.00 each, and it cost approximately $393,792 per year, per pump to maintain them)[2] Implementing pump stations at this rate would be exceptionally expensive and very unfeasible. With piping costs, estimated at $22/foot, alone would cost over $1.7M. (15.18 miles X 5280 ft/mile=$80,150.40. $80,150.40 X $22/foot=$1,763,308.80). This is very unfeasible.

Another option for water removal would be the use of disposal trucks. However, as before, the cost of purchasing the trucks, maintaining them, and hiring drivers would be a great investment. This option, too, is not feasible.

2. **Use of other discharge locations.** Indicate what other discharge locations have been evaluated and the reasons why these locations are not feasible.

There is 2 named tributaries (Acorn Fork, and Buckeye Fork) and 1 unnamed tributary (Unnamed tributary of Acorn Fork) around the jobsite. However, these tributaries are already being used for this specific project as discharge location. There are four other tributaries in the area, Toggle Fork, Goose Creek, Old Field Branch, and Hubbard's Fork. Though possible, it is unfeasible, to run the water across a mountain to these branches. This is unfeasible because of the expense that it would be. As stated above, when you run pipe uphill, you have to install lift stations, (which are approximately $200,000.00 each, and it cost approximately $ 393,792 per year, per pump to maintain them).[3] Implementing pump stations at this rate would be exceptionally expensive and very unfeasible. With piping cost, estimated at $22/foot, piping alone would cost nearly $219 thousand. (1.8809 miles X 5280 ft/mile=$9,931.52. $9,931.52 X $22/foot = $218,493.44.) This is very unfeasible, and therefore the reason why we are discharging into the three closer, more feasible branches.

II. Alternatives Analysis - continued

3. **Water reuse or recycle.** Provide information about opportunities for water reuse or recycle at this facility. If water reuse or recycle is not a feasible alternative at this facility, please indicate the reasons why.

The water from this job could be used for maintaining dust and for watering of the postmining land, but after evaluating the option, it was found to not be useful because the slope of the land is greater than 6%. With the slope of the land being greater than 6%, the water couldn't be absorbed quickly enough. The effects of this problem would greatly impact the land, and cause economic stress, by possibly causing slides, and erosion of soil. (Please note that some of the water will be used for dust containment. However, there is no feasible way to use the abundant supply of water that will be available.)
The water volume on hand at this job is 43.647 ac-ft (acre-foot). This water volume is a total of 28 ponds on the job site.
Secondly, we looked at implementing a cistern system. The normal cistern system is estimated to cost approximately $12,000.00/each 5000 gallon tank.[3] With a generous quote of 500,000 gallon of water per job, one would need at least 100 cistern tanks. Thus, the cost to even establish this option would be $1,200,000.00 ($12,000.00 X 100 tanks).
* This estimate does <u>not</u> include the cost of maintaining the cistern system. Maintenance alone is ~$16,233.00 per year/per cistern* It, again, is obvious that this wouldn't be a cost-effective method of water recycling.

4. **Alternative process or treatment options.** Indicate what process or treatment options have been evaluated and provide the reasons they were not considered feasible.
The first alternative treatment option that was explored was Limestone Sand Dosing. Limestone Sand Dosing is when limestone sand is being added to an acidic stream by a dump truck.
The limestone would be distributed downstream by periodic flooding. The sand must be replenished approximately 1 or 2 times per year, depending on flooding frequency. Limestone sand addition is most effective for streams that have low pH, but also relatively low dissolved metal concentrations. Iron and/or aluminum hydroxides precipitate in the stream, but probably over a shorter stretch than without treatment. [4] This option is available but somewhat unrealistic. As stated, the limestone sand is added by dump trucks. Even with the availability of trucks already on site, one isn't guaranteed this option will work. The site must have truck access to stream at all times. All ponds may not have truck access at all points in time, therefore hindering the use of this option. This is not withstanding the cost to do this option. According to a study, the estimated cost of this project is $200,000 [5] per site. This estimate includes the $350.00/ton of limestone cost, and the cost of sand. The cost, alone, per small dump truck is ~$47,500.00, not including maintenance and upkeep. At $200,000.00+ per limestone sand dosing site, this cost is heavily unfeasible.

A second option of limestone channeling was also considered. Limestone channel bars are constructed by combining limestone gravel and sand. The limestone gets coated by iron or aluminum hydroxides, but some limestone dissolution still occurs. These methods are most effective for streams that have low pH, but also relatively low dissolved metal concentrations. Iron and/or aluminum hydroxides precipitate in the stream. Again, the cost of installation and upkeep would reach well over $200,000.00 per site. (Including limestone and the cost of dump trucks)The cost, alone, is unfeasible. Too, this option isn't workable because

1. Limestone does not guarantee a safe result.
2. Limestone is easily coated and is then ineffective.
3. Limestone must be replaced regularly.

4. Limestone is unpredictable. [6]

Both options obviously aren't reliable and may impose unsafe conditions, notwithstanding the fact that results on ph, alkalinity and other water tested components are going to fully depend on the limestone actions, therefore being inaccurate.

II. Alternatives Analysis - continued

5. **On-site or subsurface disposal options.** Discuss the potential for on-site or subsurface disposal. If these options are not feasible, then please indicate the reasons why.

One would be a site-specific sewage system. In most cases, the disposal of wastewater into public sewers is an infeasible option, as the mining facility is normally located in remote areas away from the urban settlements. Even if the mining industry is located nearby a public sewer, it may not be allowed to discharge the wastewater into public sewers as the quantity and quality of mine wastewater can create considerable imbalance in the operation of municipal wastewater treatment plant. However, the cost of building a site specific septic system is great. As stated above, to effectively transport the discharge to this facility it would require multiple lift and pump stations, (which are approximately $200,000.00 each, and it cost approximately ***$ 393,792*** per year, per pump to maintain them)[7] Implementing pump stations at this rate would be exceptionally expensive and very unfeasible. With piping cost, estimated at $22/foot, alone piping for a 5 mile radius would cost over $580,000.00. (5 miles X 5280 ft/mile= $26,400.00. $26,400.00 X $22/foot = $580,800.00). Too, after the job is finished, there would be no sewage users, thus the septic system would have to be removed. (The cost for this would also be great.) At paying men ~$25.00 per hour to remove lines, haul garbage, etc, the removal would cost, alone, more than $30,000.00. (4 men working at 4 weeks =-640 hours. 640 hours X $25.00/hour = $16,000.00. $16,000.00 + the cost to remove and dispose of the system = $20,000.00+)

The next option evaluated was the use to dispose wastewater into and underground mine through a piping system. This would have been a workable option if the underground mine within the permit areas was not being worked. The underground mine was proposed in permit 860-5238, and is operated by Diamond May Coal Company. The mine is currently active, therefore cannot be used as a water reservoir.

6. **Evaluation of any other alternatives to lowering water quality.** Describe any other alternatives that were evaluated and provide the reasons why these alternatives were not feasible.

Choosing not to mine this area as a means of lowering water quality was evaluated, but due to the loss of jobs, loss of other indirect jobs, and loss of revenues relating to this operation would have a negative economic effect. An estimated 45 jobs will be lost in this area if it's not chosen to be mined. Also, the county will lose $577,646.00 in severance tax money.

Because surface mining techniques must be used to maximize the recovery of coal reserves, on site water treatment were considered. Sediment ponds will be used to retain the water for an acceptable amount of time to allow the solids to settle effectively. Silt fences and straw bales can be used in lower elevations where run-off may not flow to a pond. However these fences would not be stable in the steeper areas where strong flows could/ would possibly sweep them away.

Another alternative would be to accept more stringent water limits. This would cause the iron requirement to go from 1.0 to 0.5. To maintain these limits, one would have to continually ad soda ash and lime. According to a test run in AMDtreat4.0 (this program can be obtained and downloaded at http://amd.osmre.gov/GettingStarted.htm#Reverse) to maintain these limits would cost approximately $23,512.00 more than the current costs. Withstanding the fact that the lowering of limits wants to be avoided, the cost is quite steep per change.

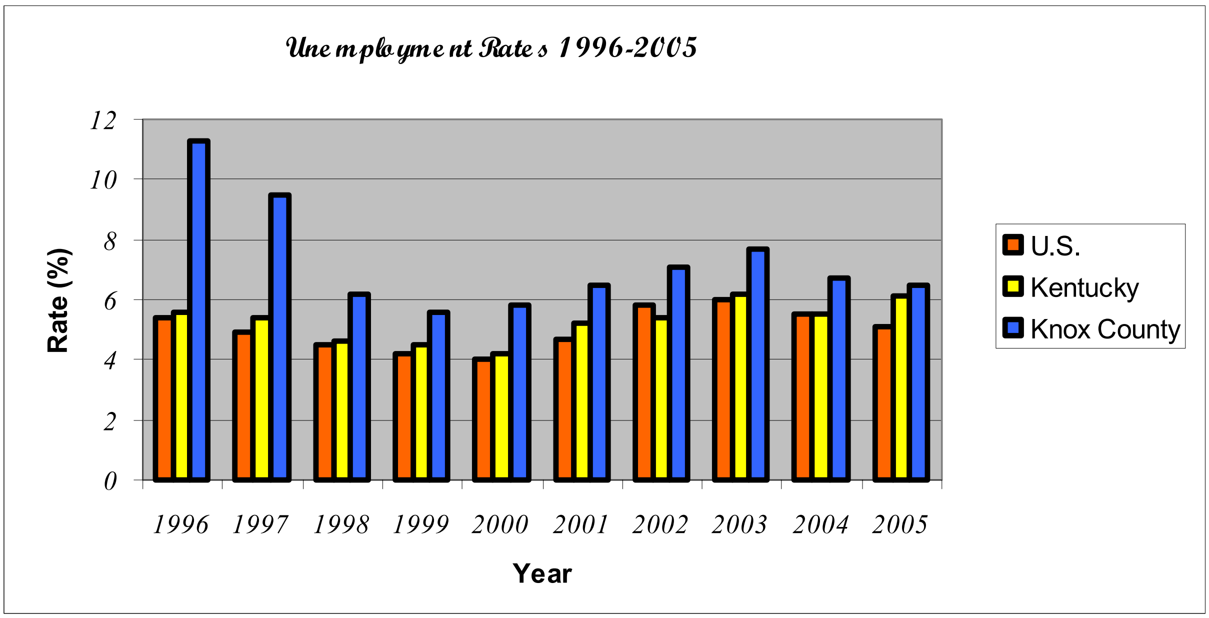
III. Socioeconomic Demonstration

1. State the positive and beneficial effects of this facility on the existing environment or a public health problem.

Prior underground mining occurred in this area, thus negatively affecting some of the watersheds. However, the area will benefit because once mitigation begins, the stream banks will be stabilized to prevent erosion. Also, species indigenous to the area will be planted and help establish an adequate riparian zone; Stream channels will be rehabilitated to curb sedimentation. This will provide a healthier habitat for aquatic species and wildlife leading to a well balanced ecosystem.
State and federal regulations are being followed so that no problems occur.

2. Describe this facility's effect on the employment of the area

Employment in the Mills community will be directly and indirectly impacted with new employment. The community of Mills in Knox County has an unemployment rate that is quite higher than the state and national averages. (See Chart below) This specific project is expected to employ approximately 45 individuals who will aide in lowering the unemployment rate, in an area that lacks employment and business opportunities. Each unemployed person who becomes employed in the Mills community are estimated to make an income of $18,000.00 annually.[8]



3. Describe how this facility will increase or avoid the decrease of area employment.

Knox County is heavily dependant on the coal industry for employment and funding. According to www.coaleducation.org, Knox County miners make up 0.6% of the total employed people in the county. The employees of Mills make up 68% of this total number. (The total number of mining employees in Knox County = 66. Approximate total at Mills = 45). Therefore, the ongoing work of this job will help maintain the employment number, and aid in raising it.
If the jobs were taken away, there would be a detrimental effect on people, causing a drastic rise in unemployment rates. The jobs continued by this project will assure that these employees won't become a part of that number.

4. Describe the industrial or commercial benefits to the community, including the creation of jobs, the raising of additional revenues, the creation of new or additional tax bases.

In addition to direct jobs provided by this project, it will also provide indirect employment opportunities, including equipment sales, engineering services, food services, fuel sales, transportation, and other services. During the fiscal year 2004-2005, alone, Knox County generated $842,074.00 [9] in coal severance tax money, of which $577,646.00 is slated to be returned back to the county. (Mills is estimated to contribute 0.27% of this number= $2,273.60 in severance tax.) This money is used for local education, health services, and infrastructure projects. The addition of this job will contribute to this tax base.

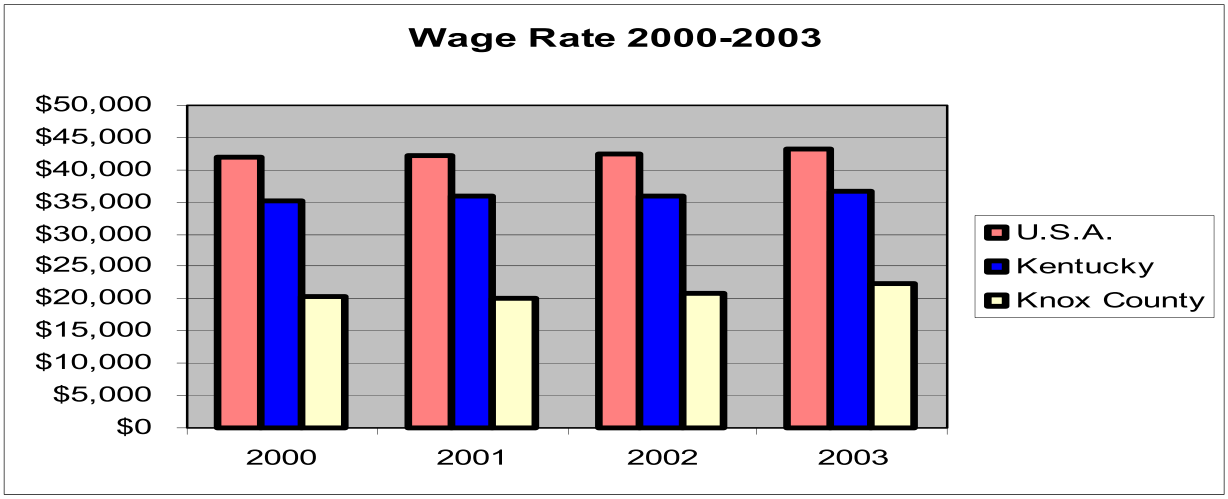
5. Describe any other economic or social benefits to the community.

As stated above, with the additional contribution of taxes that the county will receive from the coal severance taxes, public roads, buildings, and other infrastructures will benefit from this job.

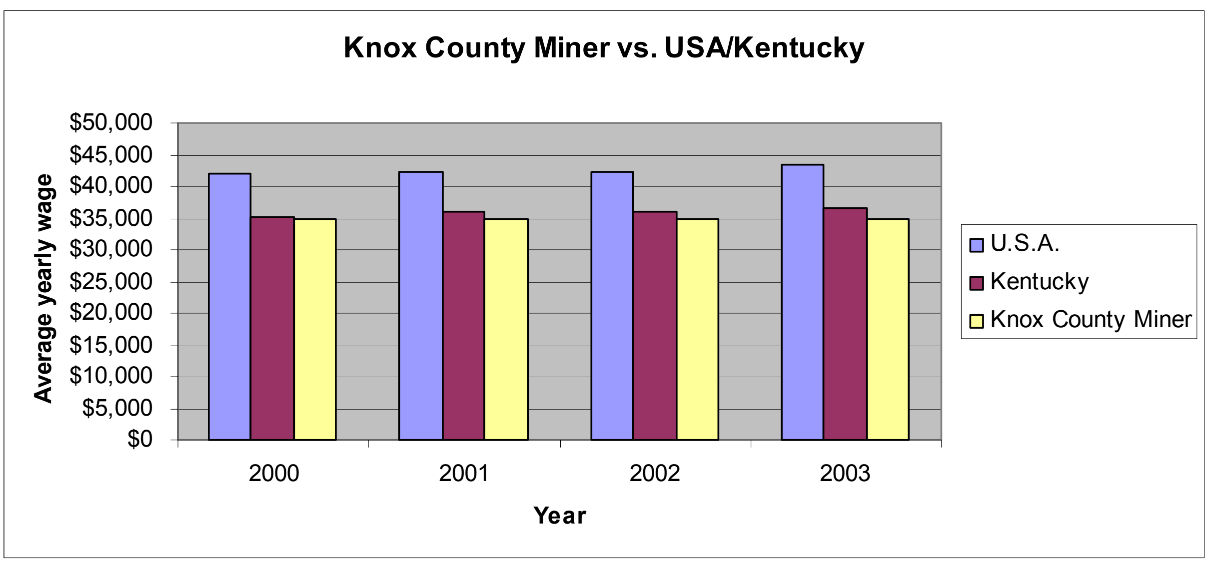
Also, the work on the haul road will benefit the public. This provides better access to the community, and since the coal operators are repairing the roads, the county monies can be distributed elsewhere.

The jobs that this project provides pay some of the highest wages in Knox County. This will obviously have a positive impact on the community's economy. The average earnings rate will rise, causing a more desirably, livable environment. The expected salaries for this job site average $670.34 weekly.

From 2000-2003, data shows that the average Knox County resident earned almost $15,100.00 per year less than the average Kentucky resident and $21,600.00 per year less than the average U.S. resident. (See chart) [10]



However, during the same period, the average Knox County **<u>miner</u>** earned $1,100.00 per year less than the average Kentuckian, and nearly $7,700.00 per year less than the average American; which is a major increase in income compared to the average Knox County resident in the chart above. (See Chart below) [11]



III. Socioeconomic Demonstration - continued

	Yes	No
6. Will this project be likely to change median household income in the county?	☒	☐
7. Will this project likely change the market value of taxable property in the county?	☒	☐
8. Will this project increase or decrease revenues in the county?	☒	☐
9. Will any public buildings be affected by this system?	☐	☒

10. How many households will be *economically* or *socially* impacted by this project? ~135 +
(45 being direct employees, 90 being indirect)

11. How will those households be *economically* or *socially* impacted? (For example, through creation of jobs, educational opportunities, or other social or economic benefits.)

The average weekly earnings for a mining employee in Knox County in 2004 was $670.34. These earnings accounted for 1.2% [12] of the total county wages for that time period. Based on this data, these households will earn $34,857.68 annually. This influx of monies will allow these households the ability to maintain and/or enhance their economic status and provides opportunities for improved social welfare. Therefore, the household is positively impacted.

	Yes	No
12. Does this project replace any other methods of sewage treatment to existing facilities? (If so describe how)	☐	☒

Residents in the surrounding permit area either use septic tank systems, or other means of waste disposal. There is no other treatment taking place within the project boundary.

	Yes	No
13. Does this project treat any existing sources of pollution more effectively? (If so describe how.)	☒	☐

Sediment control from mining will be improved. Existing overgrowth by invasive plant species will be removed and channelization of receiving streams due to excessive silting will be improved. Haul roads in the area will be maintained and improved to assure proper water containment. There are gas wells in the area, lacking any form of control. This project will improve sediment control for these locations. Prior to the start of this project, the mine site will be cleared and all garbage material will be disposed of. The estimated land run-off is 155.04 acres.

III. Socioeconomic Demonstration - continued

	Yes	No
14. Does this project eliminate any other sources of discharge or pollutants? (If so describe how.)	☒	☐

There are gas wells in the area, lacking any form of control. This project will improves sediment control for these locations.
Prior to the start of this project, the mine site will be cleared and all garbage material will be disposed of.
After completion of reclamation, these sources will be fixed.

15. How will the increase in production levels positively affect the socioeconomic condition of the area?

This project will remove approximately 558 thousand tons of coal (mining acreage X 30" X 120 = tonnage) (155.04 X 30" X120 = 558,144) of coal that would not have been recovered or made available to the market otherwise resulting in the direct employment of 45 people in the area. It will also create new employment opportunities, aid in development and maintenance of indirect jobs, and will increase the amount of money the area receives in personal and severance tax.

16. How will the increase in operational efficiency positively affect the socioeconomic condition of the area?

The increase in operational efficiency will in turn increase the production levels leading to increased employment opportunities in the area, maintenance of existing employment, development and maintenance of indirect jobs. It will also increase monies and taxes obtained form coal.
Through this, recovery of more coal is possible, and this leads to increase in production having a positive effect on the area.

IV Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and Title:		**Telephone No.:**	
Signature:		**Date:**	

Kentucky Pollutant Discharge Elimination System (KPDES)
Instructions
KPDES Permit Application Supplemental Information

SECTION I – PERMITTEE INFORMATION

Facility Name:	Provide the name of the facility
Mailing Address, City, State, and Zip Code:	Provide the mailing address
KPDES No.:	Provide the KPDES permit number for the facility
County:	Indicate the county in which the facility is located
Receiving Water Name:	Indicate the water body into which the facility discharges or plans to discharge.

SECTION II – Alternatives Analysis

For each item, provide a synopsis of the evaluations that were performed. A successful demonstration will provide justifications as to why these alternatives were not consider viable.

Include appropriate supporting documentation.

SECTION III – Socioeconomic Demonstration

Answer yes or no as appropriate. Where indicated, provide a synopsis of the positive economic impacts that will result from this project. A successful demonstration will show why the lowering of water quality is necessary to accommodate important economic or social development in the area.

Include appropriate supporting documentation.

SECTION IV - CERTIFICATION

Name and Title:	Indicate the name and title of the person signing the form.
Telephone No.:	Provide the telephone number of the person signing the form.
Date:	Indicate the date that the form was signed.

This form is part of the permit application and must be signed as follows:

Corporation: by a principal executive officer of at least the level of vice president
Partnership or sole proprietorship: by a general partner or the proprietor respectively

[1] Distance estimate was calculated using coordinates on http://jan.ucc.nau.edu/~cvm/latlongdist.html

[2] Estimate derived from:
http://www.pumpingmachinery.com/pump_magazine/pump_articles/article_33/PS%20paper%20November%2010%202004.doc

Pump Operation Costs as a Function of Operating Flow in Wastewater Treatment
Case Study
Dr. Lev Nelik, P.E., APICS
Pumping Machinery, LLC

[3] [4] Kessner, K., 2000: How to Build a Rainwater Catchment Cistern. The March Hare, Summer 2000, Issue 25, (http://www.dancingrabbit.org/newsletter/)

[4] Acid Mine Drainage Treatment Plans
http://www.facstaff.bucknell.edu/kirby/AMDtrmt.html

[5] http://www.epa.gov/owow/nps/Success319/state/ky.htm#results

[6] **Limestone Treatment of Acid Waste**
A white paper by Wastech Controls & Engineering, Inc.,
http://www.wastechengineering.com/papers/limestone.htm

[7] Estimate derived from:
http://www.pumpingmachinery.com/pump_magazine/pump_articles/article_33/PS%20paper%20November%2010%202004.doc

Pump Operation Costs as a Function of Operating Flow in Wastewater Treatment
Case Study
Dr. Lev Nelik, P.E., APICS
Pumping Machinery, LLC

[8] http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=4090

**[9] Expanded Online Kentucky Coal Facts,
http://www.coaleducation.org/Ky_Coal_Facts/Default.htm**

[10] http://www.workforcekentucky.ky.gov/cgi/dataanalysis/incomeReport.asp?menuchoice=income

[11] http://www.coaleducation.org/Ky_Coal_Facts/Default.htm

[12] http://www.coaleducation.org/Ky_Coal_Facts/Default.htm